

 ACUTE KIDNEY INJURY

Vagus nerve stimulation may prevent AKI



VNS could be a novel method to protect the kidneys from injury



Successful prevention and treatment of acute kidney injury (AKI) remains elusive, but new data suggest that vagus nerve stimulation (VNS) could be a novel method to protect the kidneys from injury. “VNS is already used in the clinical setting for some inflammatory disorders, but our latest data now suggest that this approach might also be a suitable, non-pharmacological method to prevent AKI”, says researcher Mark Okusa.

The researchers previously showed that pulsed ultrasound can activate the cholinergic anti-inflammatory pathway (CAP) and attenuate AKI in a spleen-dependent manner. In their latest study, Okusa and colleagues hypothesized that stimulating the vagus nerve might be the relay by which the activated CAP protects the kidney. First, they isolated and stimulated the vagus nerve, 24 h or 48 h before inducing ischaemia-reperfusion injury (IRI) in mice. This procedure protected the animals from AKI, likely via the modulation of inflammatory pathways, as levels of circulating cytokines were reduced compared to those in animals

that did not undergo VNS. The experiment was then repeated in mice that underwent splenectomy. Here, VNS elicited no beneficial effect, but transfer of splenocytes from donor mice that also underwent VNS was sufficient to reinstate renal protection.

Finally, the researchers evaluated whether $\alpha 7nAChR$ (a nicotinic acetylcholine receptor and key component of the CAP) mediated the protective effects of VNS. Protection from IRI was lost in $\alpha 7nAChR^{+/-}$ mice, but adoptive transfer of VNS-conditioned splenocytes from wild-type mice into knockout animals provided protection from IRI.

“We now plan to use optogenetic tools to define the neuroimmune circuitry that links the CAP with AKI”, says Okusa. “We also hope to translate our studies to humans to determine the potential use of VNS in AKI and other inflammatory conditions”.

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